



Building Technologies Program Overview

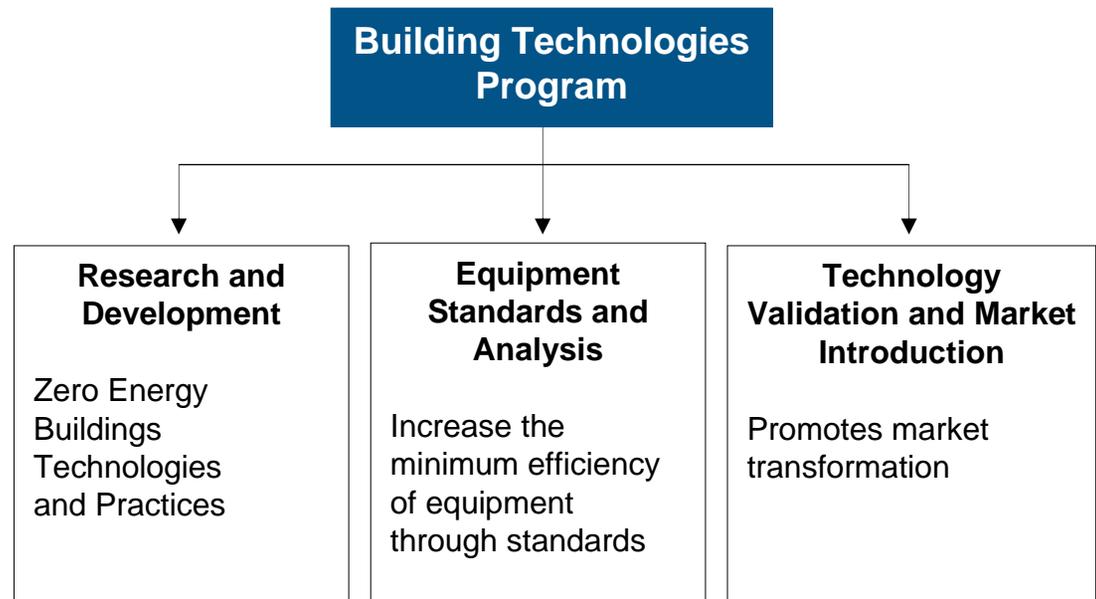
Jerry Dion
Research Supervisor
Building Technologies Program

Integrating Social and Behavioral Insights
October 6, 2009



The Building Technologies Program develops technologies, techniques, and tools, as well as minimum performance standards, for making residential and commercial buildings more energy efficient, productive, and affordable.

- 40 Staff Members
- FY 2009 Funding = \$140 Million
- FY 2010 Funding = \$200 Million
- Recovery Funds = \$346 Million



BTP Mission, Vision and Goals

Energy Efficiency &
Renewable Energy



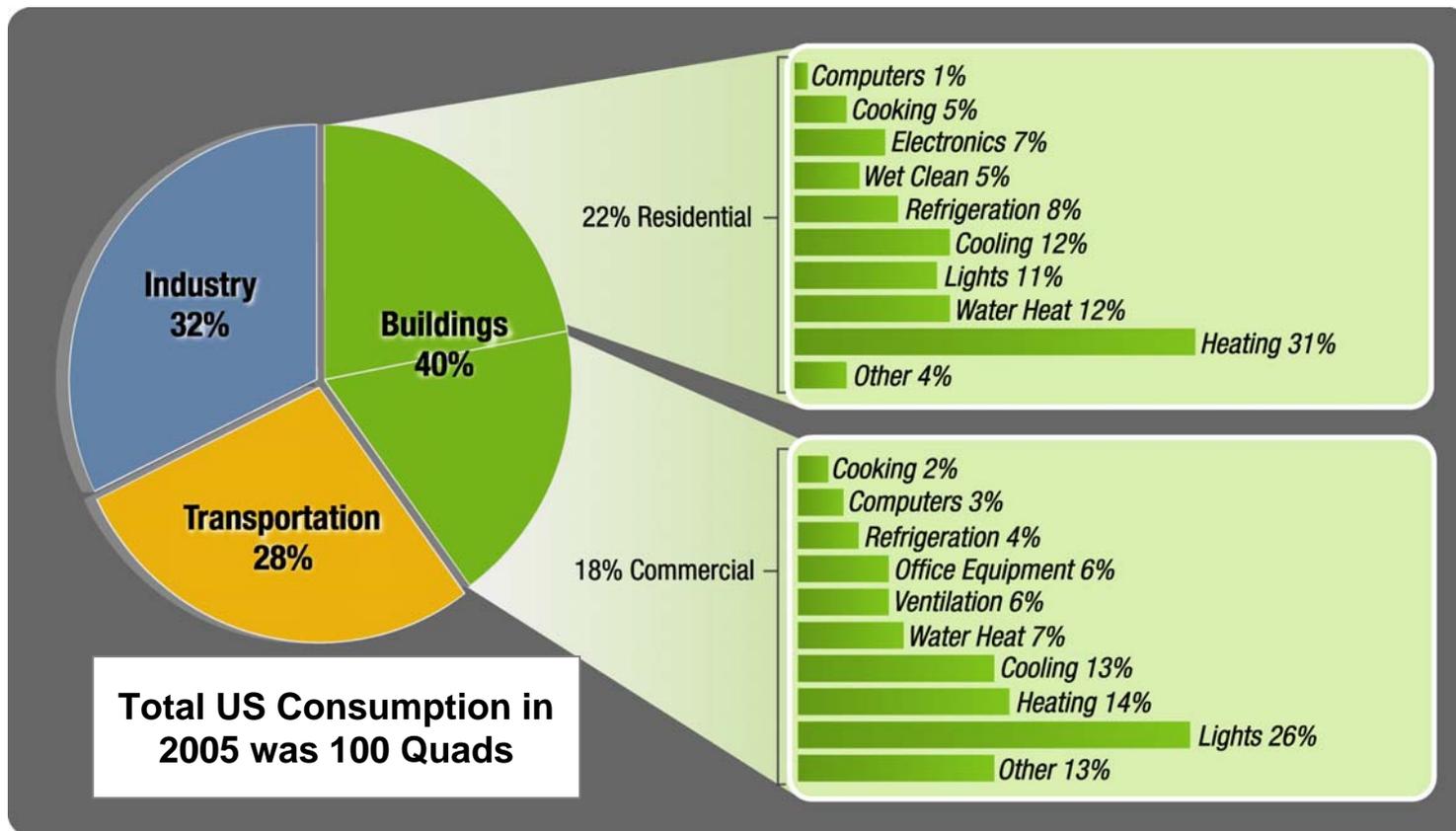
Mission: Develop technologies, techniques, and tools for making residential and commercial buildings more energy efficient, productive, and affordable.

Vision: Realization of marketable net-zero-energy buildings through the development of conservation technologies and practices.

Goal: Create technologies and design approaches that enable net-zero energy buildings at low incremental cost by 2025.

Definition: A net-zero energy building is a residential or commercial building with greatly reduced needs for energy through efficiency (60 to 70 percent less energy use), with the balance of energy supplied by renewable energy sources

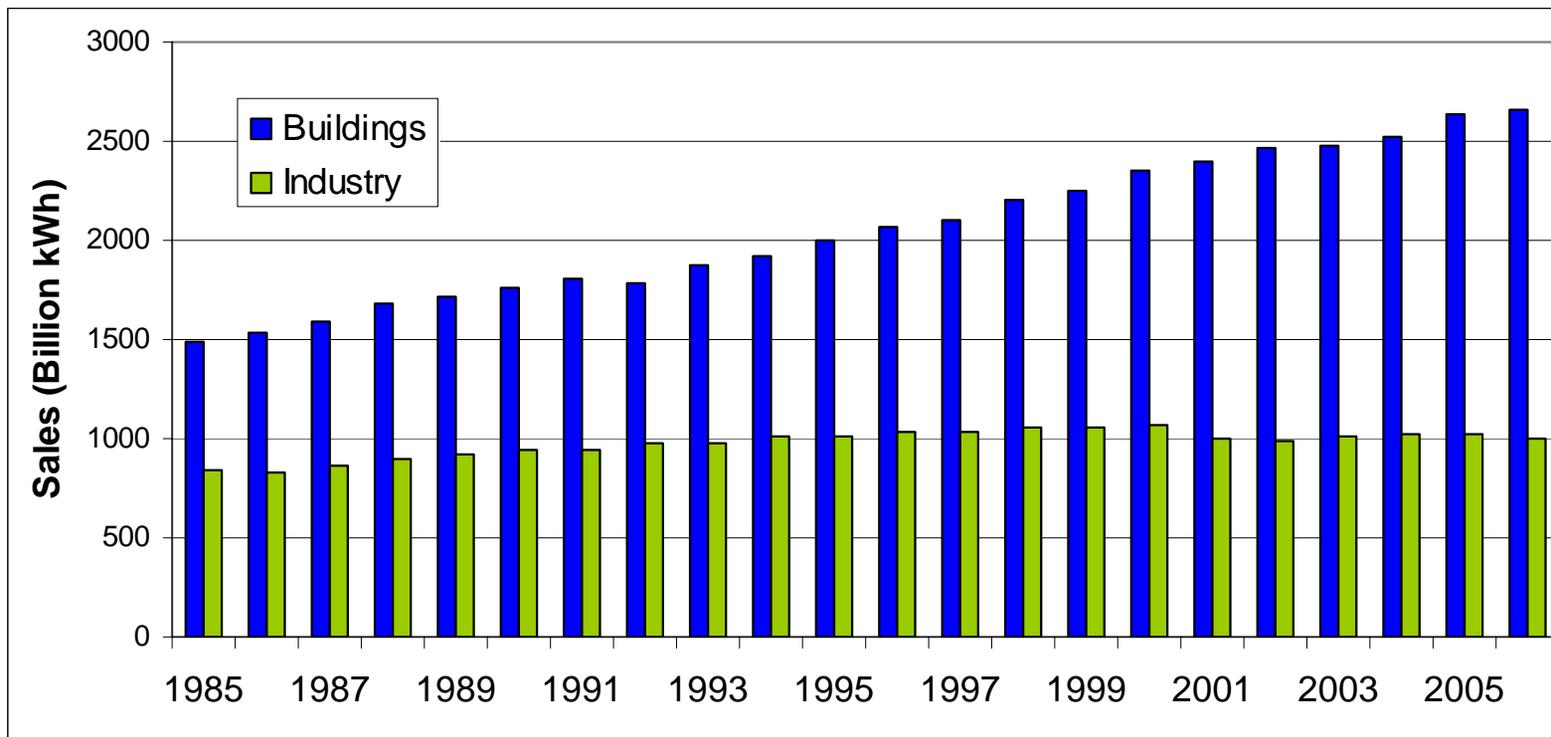
Buildings Sector Accounts for About 40% of US Energy, 72% of Electricity, 55% of Natural Gas, 39% of Carbon, 19% of NO_x, and 52% of SO₂ Emissions.



Building Sector construction and renovation accounts for 9% of GDP and employs 8 million people. Energy utility bills total \$370B each year.

Buildings Electricity Sales Continue to Grow While Industry Remains Flat

Energy Efficiency &
Renewable Energy



Source: EIA Annual Energy Review, Table 8.9

Achieving Net-Zero Whole Building Performance Drives Buildings R&D

Energy Efficiency &
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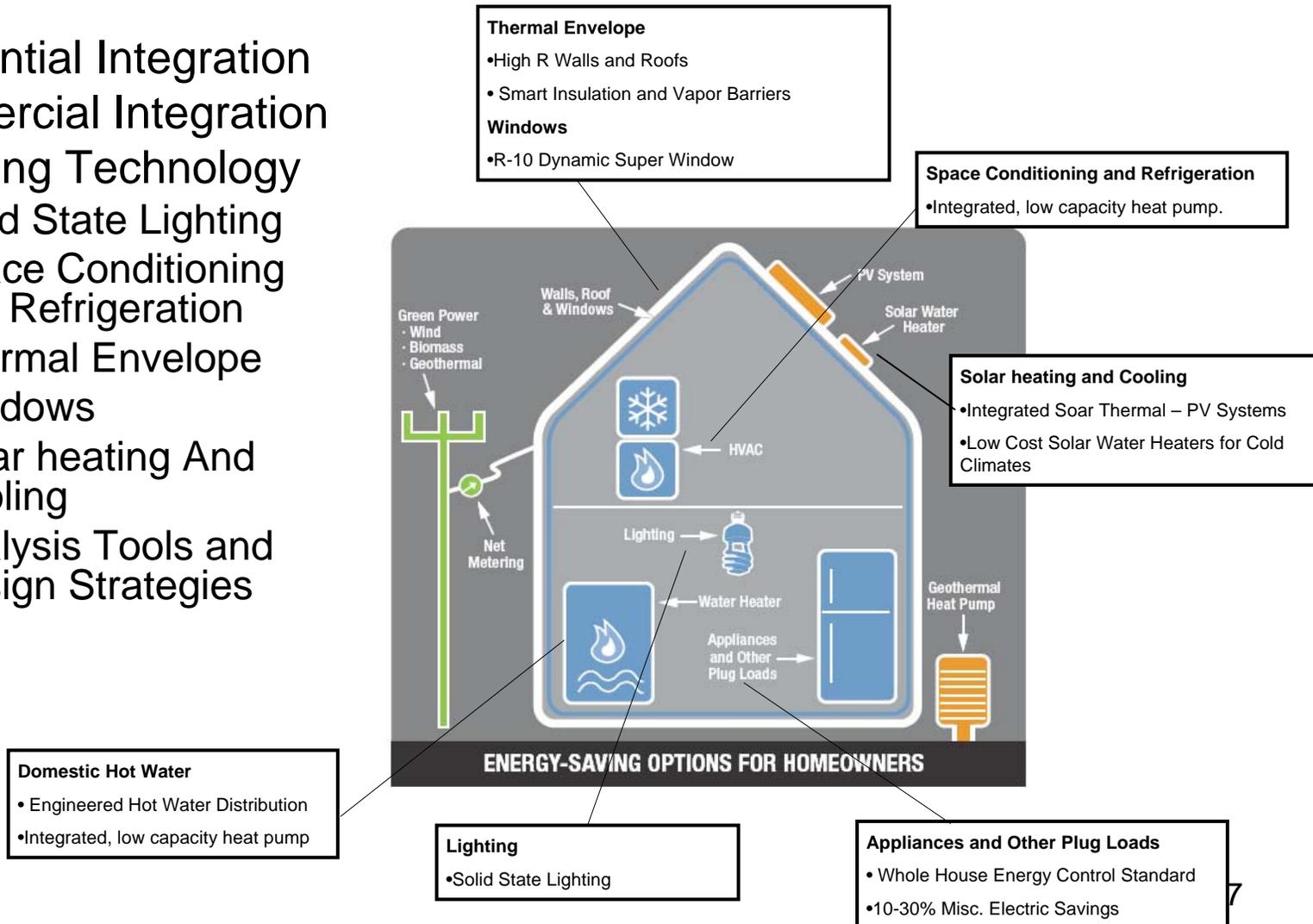


- BTP R&D is guided by whole-building systems engineering principles and practices
- BTP R&D goals are technology neutral and cost-constrained
- BTP whole buildings Integration R&D includes analysis, design, construction, operations, maintenance and retrofit/renovation
- BTP component and equipment R&D is driven by cost and technical performance requirements *needed to deliver zero-net energy buildings*
- BTP R&D extends to market barriers, human dimensions, financial incentives, and public policy mechanisms

Research and Development: Integration of Technologies



- Residential Integration
- Commercial Integration
- Emerging Technology
 - Solid State Lighting
 - Space Conditioning and Refrigeration
 - Thermal Envelope
 - Windows
 - Solar heating And Cooling
 - Analysis Tools and Design Strategies



Technology Validation and Market

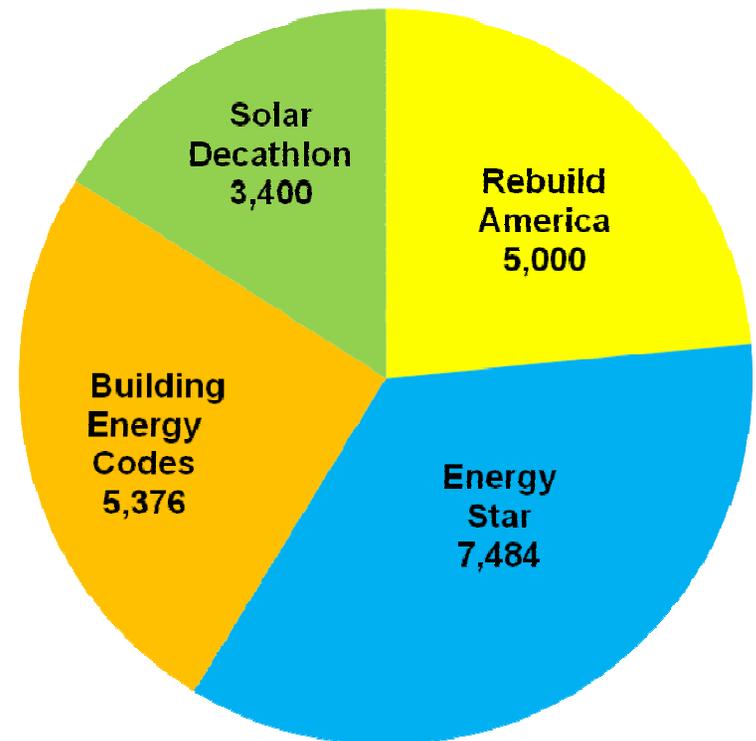
Introduction

Energy Efficiency &
Renewable Energy



- ENERGY STAR
 - Criteria development (e.g., appliances, solid-state lighting, future products)
 - Existing homes (Home Performance with ENERGY STAR)
 - A DOE, EPA, and HUD program to target energy efficiency in existing homes
 - Retail partnerships (national campaigns, whole home services, merchandising)
- Building Codes
 - Commercial: ASHRAE 90.1-2010 30% improvement goal
 - Residential: IECC Model Code push toward 30% improvement, 2009 IECC 12–17% increase in stringency
- Targeted Markets
 - EnergySmart Schools
 - EnergySmart Hospitals
- Solar Decathlon Fall 2009

FY 2009 Budget. \$1,000s



Appliance Standards



- Energy efficiency standards and test procedures issued for 16 products from 1987 through 2007
 - Standards for some products raised more than once
- DOE Must Issue another 18 standards between January 2008 and June 2011
 - Covers some of the same products again
 - http://www1.eere.energy.gov/buildings/appliance_standards/index.html
- EISA 2007 amends and extends EPACT 2005 to revisit or issue standards for another 9 products
 - Most notable is Incandescent General Service Lamps

Web Resources

Energy Efficiency &
Renewable Energy



DOE Building Technologies Program

buildings.energy.gov

Building America

buildings.energy.gov/building_america/

Commercial Building Initiative

buildings.energy.gov/commercial_initiative/

Appliances and Commercial Equipment Standards

buildings.energy.gov/appliance_standards/

ENERGY STAR

buildings.energy.gov/energystar.html

Building Energy Codes

buildings.energy.gov/energycodes.html

BT Reports

Energy Efficiency &
Renewable Energy



- **Building Technologies Program (BTP) Multi-Year Program Plan**

buildings.energy.gov/mypp.html

- **Building Technologies Program's 2008 Buildings Energy Data Book**

btscoredatabook.net/

- **Lost Opportunities in the Buildings Sector: Energy-Efficiency Analysis and Results**

www.pnl.gov/main/publications/external/technical_reports/PNNL-17623.pdf

- **Energy Efficiency Trends in Residential and Commercial Buildings**

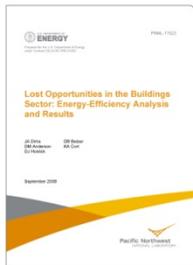
http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/bt_stateindustry.pdf

- **Implementation Report: Energy Conservation Standards Activities**

buildings.energy.gov/appliance_standards/pdfs/congressional_report_0208.pdf

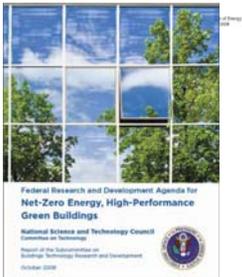
- **Federal R&D Agenda for Net-Zero Energy, High-Performance Green Buildings**

ostp.gov/galleries/NSTC%20Reports/FederalRDAGendaforNetZeroEnergyHighPerformanceGreenBuildings.pdf



Implementation Report:
Energy Conservation Standards Activities

Submitted Pursuant to
Section 101 of the Energy Policy Act of 2005
Section 101 of the Energy Independence and
Security Act of 2008



Building America Best Practices Guides and Case Studies

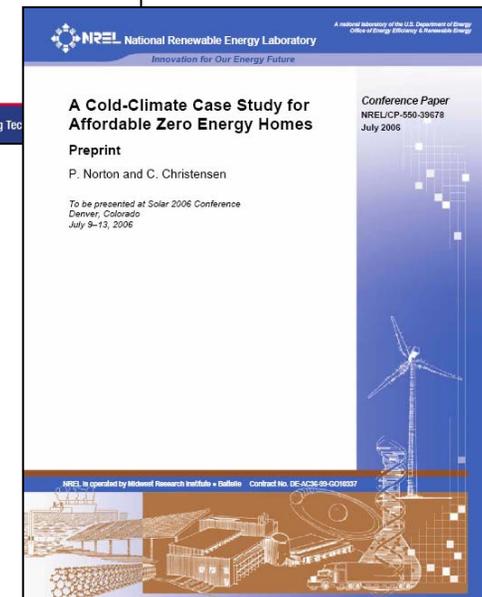
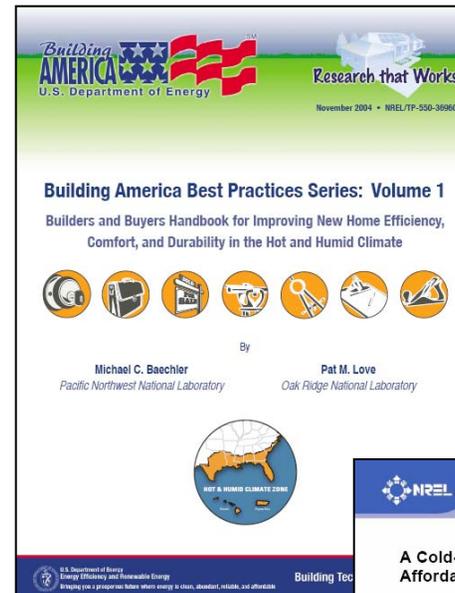
Energy Efficiency & Renewable Energy



URL:

www1.eere.energy.gov/buildings/building_america/publications.html

- **Cold & Very Cold Climates**
 - Best Practices Handbook
 - [Case Studies](#)
- **Hot-Dry & Mixed-Dry Climates**
 - Best Practices Handbook
 - [Case Studies](#)
- **Hot-Humid Climate**
 - Best Practices Handbook
 - [Case Studies](#)
- **Marine Climate**
 - Best Practices Handbook
 - [Case Studies](#)
- **Mixed-Humid Climate**
 - Best Practices Handbook
 - [Case Studies](#)
- **All Climates**
 - Solar Thermal & Photovoltaic Systems



Advanced Energy Design Guides for 30% Energy Savings

ASHRAE, IESNA, USGBC, AIA, DOE

Energy Efficiency &
Renewable Energy



www.ashrae.org/aedg

More URLs: Technical Support Documents for AEDGs

30% Energy Savings

- Small Retail
www.pnl.gov/main/publications/external/technical_reports/PNNL-16031.pdf
- Small Office
www.pnl.gov/main/publications/external/technical_reports/PNNL-16250.pdf
- Highway Lodging
www.pnl.gov/main/publications/external/technical_reports/PNNL-17875.pdf
- Small Warehouse
www.pnl.gov/main/publications/external/technical_reports/PNNL-17056.pdf
- K-12 Schools www.nrel.gov/docs/fy07osti/42114.pdf

50% Energy Savings

- Medium Box Retail www.nrel.gov/docs/fy08osti/42828.pdf
- Grocery Stores www.nrel.gov/docs/fy08osti/42829.pdf

Contacts

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Jerry Dion, Research Supervisor

jerry.dion@ee.doe.gov

<http://buildings.energy.gov/>